# Homework: Test Levels and Test Types

## Unit Testing in the Real Life: Testing a Battery

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| **Test #1** | Take a **bulb 1.5V** and check if it works as expected: The bulb should light up after connection properly. |
| **Test #2** | Take **multimeter** and check the voltage. It should be ~ 1.5V. |
| **Test #3** | Take the battery and check it **visualy**:   * Check that it meets the **AA size standard:** * Check its **length.** * Check its **diameter**. * Check if it has a form of **cylinder**. * Check for **leakage, damage, corrosion,** etc. |
| **Test #4** | Check with a compatible **flashlight**. This will check two things:   * Whether battery size matches the flashlight. * Whether the batteries work as expected ( light the bulb). |
| **Test #5** | Check the labels on the battery.   * The denoted size should be “**AA**”. * The denoted voltage should “**1.5V**”. * The denoted the **manufacturer’s name.** * The denoted the **expiration date** label. It should be **in the future**. |
| **Test #6** | Check if **“+”** and **“-“** are correctly positioned. Use a **multimeter**. |
| **Test #7** | Environmental test:   * Low temperature, e.g. **-10 degree Celsius**. * High temperature, e.g. **60 degree Celsius**. |
| **Test #8** | Check for overheating when in use. |

## Unit Testing in the Real Life: Testing a Light Bulb

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| **Test #1** | Ensure that we have a **1.5V battery** or power source available to **test the light bulb**. |
| **Test #2** | Insert the light bulb into a **compatible socket** or **fixture designed for E10 bulbs**. |
| **Test #3** | Connect the positive and negative terminals of the battery to the corresponding terminals on the bulb's socket or fixture. |
| **Test #4** | **Observe** the light bulb to see if it **illuminates as expected**. |
| **Test #5** | **Brightness Test:** Test the brightness of the bulb to ensure that it is adequate for its intended use. |
| **Test #6** | **Color Temperature Test:** Test the color temperature of the bulb to ensure that it is within the expected range and that it produces a color that is suitable for its intended use. |
| **Test #7** | **Beam Angle Test:** Test the beam angle of the bulb to ensure that it is appropriate for its intended use and that it provides adequate coverage. |
| **Test #8** | **Flicker Test:** Test the bulb for flicker to ensure that it does not produce a strobing effect that could be harmful to users with certain medical conditions. |
| **Test #9** | **Lifetime Test:** Test the expected lifetime of the bulb to ensure that it meets industry standards and that it is suitable for its intended use. |
| **Test #10** | We **visually check** whether **the wire** of the bulb is healthy. |

## Unit Testing in the Software World: Age Checker

|  |  |  |
| --- | --- | --- |
| **#** | **Test Description** | **Pass / Fail** |
| **Test #1** | AgeChecker(5) 🡪 child | Pass |
| **Test #2** | AgeChecker(12,9) 🡪 child | Pass |
| **Test #3** | AgeChecker(13) 🡪 teenager | Pass |
| **Test #4** | AgeChecker(13,1) 🡪 teenager | Pass |
| **Test #5** | AgeChecker(15) 🡪 teenager | Pass |
| **Test #6** | AgeChecker(19,9) 🡪 teenager | Pass |
| **Test #7** | AgeChecker(20) 🡪 adult | Pass |
| **Test #8** | AgeChecker(20,1) 🡪 adult | Pass |
| **Test #9** | AgeChecker(45) 🡪 adult | Pass |
| **Test #8** | AgeChecker(64,9) 🡪 adult | Pass |
| **Test #9** | AgeChecker(65) 🡪 elder | Pass |
| **Test #10** | AgeChecker(65,1) 🡪 elder | Pass |
| **Test #11** | AgeChecker(100) 🡪 elder | Pass |
| **Test #12** | AgeChecker(149,9) 🡪 elder | Pass |
| **Test #13** | AgeChecker(150) 🡪 error | Fail |
| **Test #14** | AgeChecker(150,1) 🡪 error | Pass |
| **Test #15** | AgeChecker(170) 🡪 error | Pass |
| **Test #16** | AgeChecker(-55) 🡪 error | Pass |
| **Test #17** | AgeChecker(-0,1) 🡪 error | Pass |

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## Unit Testing in the Software World: Income Checker

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| **#** | **Test Description** | **Pass / Fail** |
| **Test #1** | IncomeChecker(0) 🡪 low | Fail |
| **Test #2** | IncomeChecker(250) 🡪 low | Pass |
| **Test #3** | IncomeChecker(750.40) 🡪 low | Pass |
| **Test #4** | IncomeChecker(999,99) 🡪 low | Pass |
| **Test #5** | IncomeChecker(1000) 🡪 mid | Pass |
| **Test #6** | IncomeChecker(1000,01) 🡪 mid | Pass |
| **Test #7** | IncomeChecker(2000) 🡪 mid | Pass |
| **Test #8** | IncomeChecker(2999,99) 🡪 mid | Pass |
| **Test #9** | IncomeChecker(3000) 🡪 high | Pass |
| **Test #10** | IncomeChecker(3000,01) 🡪 high | Pass |
| **Test #11** | IncomeChecker(5000) 🡪 high | Pass |
| **Test #12** | IncomeChecker(-0,01) 🡪error | Pass |
| **Test #13** | IncomeChecker(-500) 🡪error | Pass |

## Integration Testing in the Real Life: Lighting the Bulb

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| **Test #1** | Implement the follow circuit, using the provided components:  A picture containing shape  Description automatically generated  The bulb should **light.** |
| **Test #2** | Implement the follow circuit, using the provided components:  Diagram  Description automatically generated  **Switch on** the switch button 🡪 the bulb should **light**. |
| **Test #3** | Implement the follow circuit, using the provided components:  Diagram  Description automatically generated  **Switch off** the switch button 🡪 the bulb should **not light**. |

## \* Integration Testing in the Software World: Ads

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| **Test #1** | **Test Login with Valid Credentials:**  Verify that a registered user can log in using the correct username and password, and that they are redirected to the User Home Page after successful login. |
| **Test #2** | **Test Login with Invalid Credentials:**  Verify that a user cannot log in with incorrect username and/or password, and that they receive an appropriate error message. |
| **Test #3** | **Test Logout Functionality:**  Verify that the Logout button on the User Home Page logs the user out and redirects them to the Home Page, and that the user cannot access the User Home Page after logout. |
| **Test #4** | **Test New Ad Publication:**  Verify that a registered user can publish a new ad from the User Home Page and that the ad appears on the Home Page with the correct category and town. |
| **Test #5** | **Test Own Ads Viewing:**  Verify that a registered user can view their own published ads from the User Home Page, and that only their own ads are displayed. |
| **Test #6** | **Test Profile Editing:**  Verify that a registered user can edit their profile from the User Home Page, and that the changes are saved correctly. |
| **Test #7** | **Test Navigation Box:**  Verify that the User Home Page includes the navigation box with options to publish a new ad, view own published ads, and edit profile, and that these options work correctly. |
| **Test #8** | **Test Category and Town Browsing:**  Verify that the Home Page allows users to browse ads by categories and/or by towns, and that the ads displayed match the selected category and/or town. |
| **Test #9** | **Test Home Page Display:**  Verify that the Home Page displays all published ads correctly, including the ad title, description, category, town, and date posted. |

## \* Integration Testing in the Software World: Credit Risk

Input ranges and respective credit risk:

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| --- | --- | --- | --- | --- | --- |
|  | **child** | **teenager** | **adult** | **elder** | **negative** |
| **low** | 100% | 80% | 55% | 60% | Error |
| **mid** | 100% | 72% | 37% | 44% | Error |
| **high** | 100% | 64% | 19% | 28% | Error |
| **negative** | Error | Error | Error | Error | Error |

Test cases with execution results:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **#** | **Test Description** | **Age group** | **Income group** | **Result** | **Pass / Fail** |
| **Test #1** | CreditRisk(age: 5, income: 500) 🡪 100% | child 🡪 100% | low 🡪 50% | 100% | Pass |
| **Test #2** | CreditRisk(age: 7, income: 1500) 🡪 100% | child 🡪 100% | mid 🡪 30% | 100% | Pass |
| **Test #3** | CreditRisk(age: 9, income: 3500) 🡪 100% | child 🡪 100% | high 🡪 10% | 100% | Pass |
| **Test #4** | CreditRisk(age: 15, income: 600) 🡪 80% | teenage 🡪 60% | low 🡪 50% | 80% | Pass |
| **Test #5** | CreditRisk(age: 17, income: 1600) 🡪 72% | teenage 🡪 60% | mid 🡪 30% | 72% | Pass |
| **Test #6** | CreditRisk(age: 19, income: 3400) 🡪 64% | teenage 🡪 60% | high 🡪 10% | 64% | Pass |
| **Test #7** | CreditRisk(age: 18, income: 0) 🡪 should be 100% | teenage 🡪 60% | low 🡪 50% | 80% | Fail |
| **Test #8** | CreditRisk(age: 35, income: 400) 🡪 55% | adult 🡪 10% | low 🡪 50% | 55% | Pass |
| **Test #9** | CreditRisk(age: 32, income: 1400) 🡪 37% | adult 🡪 10% | mid 🡪 30% | 37% | Pass |
| **Test #10** | CreditRisk(age: 40, income: 3600) 🡪 19% | adult 🡪 10% | high 🡪 10% | 19% | Pass |
| **Test #11** | CreditRisk(age: 45, income: 0) 🡪 should be 100% | adult 🡪 10% | low 🡪 50% | 55% | Fail |
| **Test #12** | CreditRisk(age: 70, income: 700) 🡪 60% | elder 🡪 20% | low 🡪 50% | 60% | Pass |
| **Test #13** | CreditRisk(age: 80, income: 1700) 🡪 44% | elder 🡪 20% | mid 🡪 30% | 44% | Pass |
| **Test #14** | CreditRisk(age: 85, income: 3700) 🡪 28% | elder 🡪 20% | high 🡪 10% | 28% | Pass |
| **Test #15** | CreditRisk(age: 75, income: 0) 🡪 should be 100% | elder 🡪 20% | low 🡪 50% | 60% | Fail |

## System Testing in the Real Life: Flashlight

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| --- | --- |
| **Test #1** | **Test switch on / switch off the light.**  We take the flashlight. Put new batteries correctly. Switch on the flashlight 🡪 the bulb should light. Switch off the flashlight 🡪 the bulb should light off. |
| **Test #2** | **Test battery replacement.**  We take the flashlight. We open the flashlight from the back. Take out the old batteries. Put the new batteries correctly. We close the flashlight. Switch on the flashlight 🡪 the bulb should light. Switch off the flashlight 🡪 the bulb should light off. The replacement is correct. |
| **Test #3** | **Test bulb replacement.**  We take the flashlight. We open the flashlight from the front. Take out the bulb. Put the new bulb correctly. Close the front head of the flashlight. Switch on the flashlight 🡪 the bulb should light. Switch off the flashlight 🡪 the bulb should light off. The replacement is correct. |
| **Test #4** | **Test battery duration.**  **Preparation**: Make sure the flashlight is fully charged or has fresh batteries installed. Set the flashlight to the desired brightness level and turn it on.  **Timekeeping**: Use a stopwatch or timer to record the elapsed time.  **Continuous Operation Test**: Leave the flashlight on continuously at the desired brightness level until the batteries are drained. Record the total time it takes for the batteries to run out.  **On/Off Test**: Turn the flashlight on and off intermittently, with equal intervals of on and off time. For example, turn the flashlight on for 1 minute, then off for 1 minute, and repeat. Continue this cycle until the batteries are drained. Record the total time it takes for the batteries to run out.  **Final Evaluation**: After completing both tests, evaluate the flashlight's battery performance based on the recorded times. Compare the results to the manufacturer's specifications, if available. If the flashlight's battery life meets or exceeds expectations, it can be considered to have a good battery duration. |
| **Test #5** | **Test the illumination distance.**  **Preparation:** Choose a suitable outdoor or indoor location with a clear and unobstructed view. Make sure the flashlight is fully charged or has fresh batteries installed.  **Mark the Distance:** Mark a series of distances on the ground or a wall, starting from the flashlight and moving outward. You can use a measuring tape or any other suitable tool to mark the distances.  **Turn On the Flashlight**: Turn on the flashlight and shine it at the first marked distance. Adjust the focus of the flashlight, if applicable, to achieve the maximum illumination distance.  **Move the Flashlight**: Move the flashlight to the next marked distance and shine it again. Repeat this process for all marked distances, recording the distance at which the flashlight can still provide sufficient illumination.  **Measure the Distance:** Measure the distance at which the flashlight can still provide sufficient illumination. You can use the measuring tape or any other suitable tool to measure the distance accurately.  **Record the Results:** Record the results of the test, including the distance at which the flashlight can still provide sufficient illumination, the type of batteries used, and any other relevant information.  **Repeat the Test:** To ensure accuracy, repeat the test multiple times and take an average of the results. |
| **Test #6** | **Shock resistance test.**  **Preparation:** Choose a suitable surface for testing, such as a concrete floor or a metal table. Make sure the flashlight is fully charged or has fresh batteries installed.  **Drop Test:** Hold the flashlight at a height of 1 meter (3 feet) above the testing surface and drop it onto the surface. Repeat this process three times for each of the six sides of the flashlight, including the top and bottom. Record any damage or malfunctions that occur.  **Vibration Test:** Turn on the flashlight and secure it to a vibration table. Set the vibration table to the desired frequency and amplitude, and run the test for a specified duration, such as 30 minutes. After the test, check the flashlight for any damage or malfunctions. |
| **Test #7** | **Operation under high / low temperature.**  Place the flashlight in a freezer for several hours to expose it to cold temperatures, and then remove it and check for any damage or malfunctions. Repeat the process with a heat source, such as a heating pad or hot water, to expose the flashlight to high temperatures. |
| **Test #8** | **Water Resistance Test.**  Submerge the flashlight in a container of water for a specified duration, such as 30 minutes, and then check the flashlight for any damage or malfunctions. |

## System Testing in the Real Life: Digital Scale

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| --- | --- |
| **Test #1** | **Accuracy Test.**  Place an object of known weight, such as a dumbbell or weight plate, on the scale and verify that the weight reading matches the actual weight. Repeat the test with different weights to ensure accurate readings across a range of weights. |
| **Test #2** | **Zero Reset Test**.  Place an object on the scale and verify that the weight reading is accurate. Then, remove the object and verify that the scale resets to zero. Repeat this test several times to ensure the scale consistently resets to zero. |
| **Test #3** | **Stability Test.**  Place an object on the scale and verify that the weight reading stabilizes quickly and remains stable for several seconds. Repeat the test with different weights and ensure the scale maintains stability for all weights. |
| **Test #4** | **Maximum Weight Test.**  Place a weight that is equal to or slightly higher than the maximum weight capacity of the scale and verify that the scale accurately displays the weight. |
| **Test #5** | **Battery Test.**  Verify that the scale displays accurate weight readings when the batteries are low. Replace the batteries and verify that the scale functions correctly with new batteries. |
| **Test #6** | **Durability Test.**  Drop the scale from a height of 1 meter onto a hard surface and verify that it continues to function properly without any damage or malfunctions. |
| **Test #7** | **Calibration Test.**  Calibrate the scale using a known weight and verify that the scale displays accurate weight readings after calibration. |
| **Test #8** | **Display Test.**  Verify that the display is clear and easy to read from different angles and lighting conditions. |
| **Test #9** | **User Interface Test.**  Test the user interface to ensure that it is easy to use and navigate. Verify that all buttons and functions work correctly. |
| **Test #10** | **Data Recording Test.**  Test the data recording function to ensure that it records and stores weight readings accurately or not. |

## System Testing in the Software World: Number Calculator

|  |  |  |
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| **#** | **Test Description** | **Pass / Fail** |
| **Test #1** | Calculate(5, +, 10) 🡪 15 | Pass |
| **Test #2** | Calculate(2000000000000, +, 5) 🡪 2000000000005 | Fail |
| **Test #3** | Calculate(10x, +, man) 🡪 invalid input | Fail |
| **Test #4** | Calculate (5, -, 10) 🡪 5 | Pass |
| **Test #5** | Calculate (10, /,2 ) 🡪 5 | Pass |
| **Test #6** | Calculate (5, x , 5) 🡪25 | Pass |
| **Test #7** | Calculate (-5, +, 10) 🡪 5 | Pass |
| **Test #8** | Calculate (5, -, 10) 🡪 5 | Pass |
| **Test #9** |  |  |
| **Test #10** |  |  |
| **Test #11** |  |  |
| **Test #12** |  |  |
| **Test #13** |  |  |
| **Test #14** |  |  |
| **Test #15** |  |  |
| **Test #16** |  |  |
| **Test #17** |  |  |
| **Test #18** |  |  |
| **Test #19** |  |  |

## Acceptance Testing in the Real Life: Flashlight

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| **Test #1** | **Power On/Off Test:**  Verify that the flashlight turns on and off easily using the switch or button provided. |
| **Test #2** | **Brightness Test:**  Test the brightness of the flashlight on different modes or settings to ensure that it meets the customer's expectations and provides adequate illumination. |
| **Test #3** | **Battery Test:**  Verify that the battery is easy to install and replace, and that the flashlight operates properly with fresh batteries. |
| **Test #4** | **Size and Weight Test:**  Test the flashlight's size and weight to ensure that it is comfortable and easy to handle for extended periods of use. |
| **Test #5** | **Beam Distance Test:**  Test the flashlight's beam distance to ensure that it provides adequate illumination at various distances. |
| **Test #6** | **Ergonomics Test:**  Test the flashlight’s ergonomics to ensure that it is easy to grip and use in different scenarios, such as in the dark or with gloves on. |
| **Test #7** | **Packaging Test:**  Test the packaging to ensure that it protects the flashlight during shipping and handling and that it includes all necessary components, such as batteries or charging cables. |

## Acceptance Testing in the Real Life: Digital Scale

|  |  |
| --- | --- |
| **Test #1** | **Calibration Test:**  Verify that the scale has been properly calibrated by placing a known weight on it and checking that it measures the weight accurately. |
| **Test #2** | **Accuracy Test:**  Test the accuracy of the scale by weighing different objects of known weight, such as a bag of sugar, a gallon of water, and a dumbbell. Verify that the scale measures the weight accurately within the stated tolerance. |
| **Test #3** | **Weight Range Test:**  Test the weight range of the scale by weighing objects of different weights, from very light objects like coins to heavy objects that u can hold. Verify that the scale can measure weights within its stated range. |
| **Test #4** | **Stability Test:**  Test the stability of the scale by weighing an object and then gently nudging the scale to see if it maintains the weight measurement. Verify that the scale remains stable and accurate. |
| **Test #5** | **User Interface Test:**  Test the user interface of the scale by checking that the display is easy to read and understand, the buttons are responsive, and the scale turns on and off easily. |
| **Test #6** | **Ease of Cleaning Test:**  Test the ease of cleaning the scale by wiping it down with a damp cloth and checking that it can be easily cleaned without damaging the components. |

## Acceptance Testing in the Software World: Number Calculator

|  |  |
| --- | --- |
| **Test #1** | Calculate (5, +, 10) 🡪15 Pass |
| **Test #2** | Calculate (5, -, 10) 🡪 5 Pass |
| **Test #3** | Calculate (10, /,2 ) 🡪 5 Pass |
| **Test #4** | Calculate (5, x , 5) 🡪25 Pass |
| **Test #5** | Calculate (-5, +, 10) 🡪 5 Pass |

## Functional and Non-Functional Tests: Flashlight

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| --- | --- |
| **Functional Tests** | **Non-Functional Tests** |
| **Test switch on / switch off the light.** | **Test battery duration.** |
| **Test battery replacement.** | **Test the illumination distance.** |
| **Test bulb replacement.** | **Shock resistance test.** |
| **Test body replacement.** | **Operation under high / low temperature.** |
| **Test the button for lighting modes** | **Water Resistance Test.** |